12998-244(16) Computational Physics B (3l, 3p)
(Stochastic Simulation and Data Analysis)

2016

Course summary:

Numerical simulation of many-particle and higher dimensional systems. Topics change annually. Typically they may include stochastic growth, lattice gases, sand-pile models or percolation. Introduction to statistical data analysis.

Continuous assessment
PP Physics 114, 144
P Physics 214, 224
C Physics 254
C Scientific Computing 272

Outcomes of course:

Insight into the physics of selected simple stochastic physical systems.

- Working knowledge of basic concepts of statistics as used in physics.
- Appreciation of the fundamentally different character of computational physics as compared to analytical physics.
- The ability to write and debug simple computer simulations of stochastic physical systems.
- Appreciation of the importance and role played by numerical error and approximation in simulation.
- Develop skills in compiling and maintaining a record of own work and thoughts.
- Familiarity on beginner's level with the operating system currently used in the module and some of its numerical and graphical applications.

Lecturers:

Prof. HC Eggers
Telephone number: (021) 808-3523
E-mail address: eggers@physics.sun.ac.za
Office: Room 1042 in Merensky Building

Mentor:

For each year of our physics programme the Department of Physics has appointed a staff member as mentor to be available to students. You are always invited to discuss general issues in the physics programme or its modules with this mentor, in addition to usual consultations with your individual lecturers.

For this module your mentor is Dr PH Neethling pietern@sun.ac.za

Course content:

The course introduces numerical and mathematical methods of simulating and analysing stochastic physical systems and real data. The project-based topic changes annually; typical examples include data analysis, random walks, stochastic growth phenomena etc..Elementary programming skills are a prerequisite.

Practical (Tutorials):

Students work individually or in groups on their tutorial assignments and projects during the tutorial session under supervision of the lecturer or a tutor.

Study material:

Due to the nature of this module there is no single prescribed text book. Study notes and reference material will be handed out by the lecturer.

Learning opportunities:

The individual work on simulation projects constitutes an effective learning opportunity. Every lecture and tutorial is an opportunity to discuss the project work with the lecturer and fellow students.

Assessment:

Methods of Assessments

Continuous assessment, based mainly on workbooks containing the student's notes, results and computer programs but also a test and possibly theory homework problems.

Venue and time of assessment opportunities
A number of assessment opportunities are spread evenly throughout the semester.

Turnaround time*:*
Marks will be available within a reasonable time. Feedback is given in terms of written and oral commentary

Availability of marks:
Papers are returned as soon as possible.

Calculation of final mark for the module:
Mark allocation may change depending on the nature of a given year's project. Typical weights would be
0-20 percent: homework problems
20-40 percent: test
60-80 percent: workbooks with project notes, results, computer programs